

Table 3: Diagnostics and Variables in HEMITAP Model Simulations

metm / 3D			
VARIABLE	DIM	UNITS	DESCRIPTION
temp	3D	K	air temperature
hus	3D	kg/kg	specific humidity
cnvfluxup	3D	kg/m ² /s	convective updraft, positive up
precip	2D	kg/m ²	monthly precipitation (of all types)
airmass	2D	kg/m ²	vertically integrated mass of air
ps	2D	Pa	surface air pressure

emim / 2D			
VARIABLE	DIM	UNITS	DESCRIPTION
emi_nox	2D	kg/m ² /s	emission of NOx (=NO+NO ₂)
emi_anox	-	--	emission of anthrop. NOx
emi_co	-	--	emission of CO (Carbon monoxide)
emi_aco	-	--	emission of anthrop. CO
emi_voc	-	--	emission of NMVOC (non-Methane VOC)
emi_avoc	-	--	emission of anthrop. NMVOC
emi_bvoc	-	--	emission of biogenic NMVOC
emi_nh3	-	--	emission of NH ₃ (Ammonia)
emi_anh3	-	--	emission of anthrop. NH ₃
emi_so2	-	--	emission of SO ₂ (reduce 3D emission field to 2D)
emi_aso2	-	--	emission of anthrop. SO ₂ (reduce 3D emission field to 2D)
emi_so4	-	--	emission of SO ₄ (Sulphate dry aerosol)
emi_aso4	-	--	emission of anthrop. SO ₄
emi_bc	-	--	emission of BC (Black carbon dry aerosol)
emi_abc	-	--	emission of anthrop. BC
emi_pom	-	--	emission of Particulate Organic Matter as dry aerosol
emi_apom	-	--	emission of anthrop. POM
emi_soa	-	--	emission of Secondary organic matter as dry aerosol
emi_asoa	-	--	emission of anthrop. SOA
emi_dms	-	--	emission of dimethylsulphite
emi_du	-	--	emission of Dust dry aerosol
emi_ss	-	--	emission of Sea salt dry aerosol
emi_pcbl53	-	--	emission of Hexachlorbiphenyl
reemi_pcbl53	-	--	reemission of Hexachlorbiphenyl
emi_ahch	-	--	emission of Alpha-hexachlorocyclohexane
reemi_ahch	-	--	reemission of Alpha-hexachlorocyclohexane
emi_hg0	-	--	emissions of Hg0(g)
emi_ahg0	-	--	emissions of anthrop. Hg0(g)
emi_hg2	-	--	emissions of HgII(g)
emi_ahg2	-	--	emissions of anthrop. HgII(g)
emi_hgp	-	--	emissions of Mercury aerosol
emi_ahgp	-	--	emissions of anthrop. Mercury aerosol

tracerm / 3D			
VARIABLE	DIM	UNITS	DESCRIPTION
vmr_o3	3D	mole/mole	mole fraction in air of O ₃

vmr_o3_column	2D	Dobson	[Not in input file, Only in Tool]
vmr_no	3D	mole/mole	mole fraction in air of NO
vmr_no2	-	--	mole fraction in air of NO ₂
vmr_hno3	-	--	mole fraction in air of HNO ₃
vmr_oh	-	--	mole fraction in air of OH
vmr_pan	-	--	mole fraction in air of PAN
vmr_so2	-	--	mole fraction in air of SO ₂
vmr_dms	-	--	mole fraction in air of DMS
vmr_pcbl53	-	--	mole fraction in air of Hexachlorbiphenyl
vmr_h2o2	-	--	mole fraction in air of H ₂ O ₂
vmr_avoc	-	--	mole fraction in air of anthrop. NMVOC
vmr_bvoc	-	--	mole fraction in air of biogenic NMVOC
vmr_svoc	-	--	mole fraction in air of short-lived anthrop. NMVOC
vmr_mvoc	-	--	mole fraction in air of medium-lived anthrop. NMVOC
vmr_lvoc	-	--	mole fraction in air of long-lived anthrop. NMVOC
vmr_hg0	-	--	mole fraction in air of Hg0(g)
vmr_hg2	-	--	mole fraction in air of HgII(g)
vmr_hgp	-	--	mole fraction in air of Particulate Hg
vmr_hg180	-	--	mole fraction in air of Hg0(g) with 180-day efold decay
vmr_hg360	-	--	mole fraction in air of Hg0(g) with 360-day efold decay
vmr_hg540	-	--	mole fraction in air of Hg0(g) with 540-day efold decay
vmr_hg360fromea	-	--	mole fraction in air of hg360 from EA
vmr_hg360fromeu	-	--	mole fraction in air of hg360 from EU
vmr_hg360fromna	-	--	mole fraction in air of hg360 from NA
vmr_hg360fromsa	-	--	mole fraction in air of hg360 from SA
vmr_co	-	--	mole fraction in air of CO
vmr_codirect	-	--	mole fraction in air of CO with life time of 25 days
vmr_cofromavoc	-	--	mole fraction in air of CO from anthrop. NMVOC ox
vmr_cofrombvoc	-	--	mole fraction in air of CO from biogenic NMVOC ox
vmr_cofromea	-	--	mole fraction in air of CO from EA
vmr_cofromeu	-	--	mole fraction in air of CO from EU
vmr_cofromna	-	--	mole fraction in air of CO from NA
vmr_cofromsa	-	--	mole fraction in air of CO from SA
vmr_sadirect	-	--	mole fraction in air of soluble aerosol (sa) with life time of 50 days
vmr_safromea	-	--	mole fraction in air of sa from EA
vmr_safromeu	-	--	mole fraction in air of sa from EU
vmr_safromna	-	--	mole fraction in air of sa from NA
vmr_safromsa	-	--	mole fraction in air of sa from SA
vmr_c3h8	-	--	mole fraction in air of Propane
vmr_c2h6	-	--	mole fraction in air of Ethane
vmr_c5h8	-	--	mole fraction in air of Isoprene
vmr_c10h16	-	--	mole fraction in air of Terpene
vmr_c2h2	-	--	mole fraction in air of Acetylene
vmr_ahch	-	--	mole fraction in air of Alpha-Hexachlorocyclohexane
vmr_hcooh	-	--	mole fraction in air of Formic acid
vmr_ch3cooh	-	--	mole fraction in air of Acetic acid
vmr_ch3oh	-	--	mole fraction in air of Methanol
vmr_c2h4o3	-	--	mole fraction in air of Peroxyacetic acid
vmr_c2h4	-	--	mole fraction in air of Ethene
vmr_ch3ooh	-	--	mole fraction in air of Methylhydroperoxide

vmr_hcn	-	--	mole fraction in air of Hydrogencyanide
vmr_ch3cn	-	--	mole fraction in air of Acetonitrile
vmr_acet	-	--	mole fraction in air of Acetone
vmr_alkane4	-	--	mole fraction in air of AlkaneC4
vmr_alkene4	-	--	mole fraction in air of AlkeneC4
vmr_c2h5oh	-	--	mole fraction in air of Ethanol
vmr_c3h6	-	--	mole fraction in air of Propene
vmr_ch2o	-	--	mole fraction in air of Formaldehyde
vmr_ch3cho	-	--	mole fraction in air of Acetaldehyde
vmr_rcho	-	--	mole fraction in air of AldehydesC3
vmr_toluene	-	--	mole fraction in air of Toluene
vmr_arom	-	--	mole fraction in air of AromaticsC

sfc / 2D (see tracerm)			
VARIABLE	DIM	UNITS	DESCRIPTION
vmr_o3_m24	2D	mole/mole	vmr_o3 daily mean values (equal to vmr_o3 in tracerm)
vmr_o3_m12	-	--	vmr_o3 day-time (8H-20H) mean values
vmr_o3_m7	-	--	vmr_o3 reduced day-time (9H-16H) mean values
vmr_o3_max	-	--	vmr_o3 daily maxima of the 8-hr running mean values
vmr_o3_somo35	-	(mole/mole)x days	vmr_o3 accumulated daily concentrations of the maxima of the 8-hr running average concentration in excess of 35 ppb
vmr_o3_aot40	-	(mole/mole)x hrs	vmr_o3 accumulated hourly concentrations in excess of 40 ppb
vmr_o3_aot60	-	(mole/mole)x hrs	vmr_o3 accumulated hourly concentrations in excess of 60 ppb
vmr_o3_exc60	-	Days	number of days of exceedances over 60 ppb of the 8-hr running averaged daily maximum vmr_o3
vmr_o3_sumo6	-	(mole/mole)x hrs	Vmr_o3 accumulated hourly concentrations larger than or equal to 60 ppb
vmr_o3_w126	-	(mole/mole)x hrs	Vmr_o3 accumulated hourly concentrations with the following sigmoidal weighting function: $\{ 1. + 4403. * \exp(-0.126 * 10^9 * O3) \}^{-1}$, with O3 in ppb
vmr_no2_m24	-	mole/mole	vmr_no2 daily mean values (equal to vmr_no2 in tracerm)

sfc1 / 2D			
VARIABLE	DIM	UNITS	DESCRIPTION
vmr_hg0	2D	mole/mole	mole fraction in air of Hg0(g)
vmr_hg2	-	--	mole fraction in air of HgII(g)
vmr_hgp	-	--	mole fraction in air of Particulate Hg
vmr_pcbl53	-	--	mole fraction in air of Hexachlorbiphenyl
vmr_ahch	-	--	mole fraction in air of Alpha-Hexachlorocyclohexane

aerosolm / 3D			
VARIABLE	DIM	UNITS	DESCRIPTION
mmr_pm10	3D	kg/kg	mass fraction at 50% rel. hum of PM ₁₀
mmr_pm2p5	-	--	mass fraction at 50% rel. hum of PM _{2.5}
mmr_pm1	-	--	mass fraction at 50% rel. hum of PM ₁
mmr_pom	-	--	mass fraction of Particulate organic carbon
mmr_bc	-	--	mass fraction of BC
mmr_nh4	-	--	mass fraction of NH ₄
mmr_no3	-	--	mass fraction of NO ₃

mmr_so4	-	--	mass fraction of SO ₄
mmr_soa	-	--	mass fraction of Secondary organic matter
mmr_du	-	--	mass fraction of Dust
mmr_ss	-	--	mass fraction of Sea salt
mmr_aerh2o	-	--	mass fraction of Aerosol water

depm / 2D; wetdepm / 3D			
VARIABLE	DIM	UNITS	DESCRIPTION
dry_o3	2D	kg/m ² /s	dry deposition of O ₃
dry_hno3	-	--	dry deposition of HNO ₃
dry_no2	-	--	dry deposition of NO ₂
dry_noy	-	--	dry deposition of NO _y
dry_nh3	-	--	dry deposition of NH ₃
dry_nh4	-	--	dry deposition of NH ₄
dry_so2	-	--	dry deposition of SO ₂
dry_so4	-	--	dry deposition of SO ₄
dry_bc	-	--	dry deposition of BC
dry_pom	-	--	dry deposition of POM
dry_dms	-	--	dry deposition of DMS
dry_ss	-	--	dry deposition of Sea salt
dry_du	-	--	dry deposition of Dust
dry_pcbl53	-	--	dry deposition of Hexachlorbiphenyl
dry_ahch	-	--	dry deposition of Alpha-Hexachlorocyclohexane
dry_hg0	-	--	dry deposition of Hg0(g)
dry_hg2	-	--	dry deposition of HgII(g)
dry_hgp	-	--	dry deposition of Particulate Hg
sto_o3	-	--	dry deposition of O ₃ in stomata
wet_noy	-	--	wet deposition of NO _y
wet_hno3	-	--	wet deposition of HNO ₃
wet_nh3	-	--	wet deposition of NH ₃
wet_nh4	-	--	wet deposition of NH ₄
wet_so2	-	--	wet deposition of SO ₂
wet_so4	-	--	wet deposition of SO ₄
wet_bc	-	--	wet deposition of BC
wet_pom	-	--	wet deposition of POM
wet_dms	-	--	wet deposition of DMS
wet_ss	-	--	wet deposition of Sea salt
wet_du	-	--	wet deposition of Dust
wet_pcbl53	-	--	wet deposition of Hexachlorbiphenyl
wet_ahch	-	--	wet deposition of Alpha-Hexachlorocyclohexane
wet_hg0	-	--	wet deposition of Hg0(g)
wet_hg2	-	--	wet deposition of HgII(g)
wet_hgp	-	--	wet deposition of Particulate Hg
wetcnv_sadirect	3D	mole/m ² /s	convective wet deposition of soluble aerosol (sa)
wetcnv_saformea	-	--	convective wet deposition of sa from EA
wetcnv_saformeum	-	--	convective wet deposition of sa from EU
wetcnv_saformna	-	--	convective wet deposition of sa from NA
wetcnv_safromsa	-	--	convective wet deposition of sa from SA
wetdep_sadirect	-	--	wet deposition of soluble aerosol (sa)
wetdep_saformea	-	--	wet deposition of sa from EA
wetdep_saformeum	-	--	wet deposition of sa from EU

wetdep_saformna	-	--	wet deposition of sa from NA
wetdep_safromsa	-	--	wet deposition of sa from SA
wetlsp_sadirect	-	--	Large-scale wet deposition of soluble aerosol (sa)
wetlsp_saformea	-	--	Large-scale wet deposition of sa from EA
wetlsp_safromeu	-	--	Large-scale wet deposition of sa from EU
wetlsp_saformna	-	--	Large-scale wet deposition of sa from NA
wetlsp_safromsa	-	--	Large-scale wet deposition of sa from SA

aerosolaod / 2D			
VARIABLE	DIM	UNITS	DESCRIPTION
od550_pm10	2D	1	optical thickness at 550 nm PM ₁₀
od550_pm25	-	-	optical thickness at 550 nm PM _{2.5}
od550_pm1	-	-	optical thickness at 550 nm PM ₁
od550_no3	-	-	optical thickness at 550 nm NO ₃
od550_so4	-	-	optical thickness at 550 nm SO ₄
od550_nh4	-	-	optical thickness at 550 nm NH ₄
od550_bc	-	-	optical thickness at 550 nm BC
od550_pom	-	-	optical thickness at 550 nm POM
od550_ss	-	-	optical thickness at 550 nm Sea salt
od550_du	-	-	optical thickness at 550 nm Dust
od550_aerh2o	-	-	optical thickness at 550 nm Aerosol water

budgetm / 3D			
VARIABLE	DIM	UNITS	DESCRIPTION
prod_o3	3D	mole/m ³ /s	production rate of mole concentration O ₃
loss_o3	-	--	destruction rate of mole concentration O ₃
loss_ch4	-	--	destruction rate of mole concentration CH ₄
loss_co	-	--	destruction rate of mole concentration CO
loss_ch3nc	-	--	destruction rate of mole Acetonitrile
loss_hcn	-	--	destruction rate of mole Hydrogencyanide

vertprof / vertprof			
VARIABLE	DIM	UNITS	DESCRIPTION
vmr_o3		mole/mole	See tracerm
vmr_no		--	--
vmr_no2		--	--
vmr_svoc		--	--
vmr_mvoc		--	--
vmr_lvoc		--	--
vmr_co		--	--
vmr_codirect		--	--
vmr_cofromea		--	--
vmr_cofromeu		--	--
vmr_cofromna		--	--
vmr_cofromsa		--	--